

Handwritten initials or mark.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/504,660	02/14/2000	William E. Hoke	07206-047001	8160
22494	7590	10/17/2003	EXAMINER	
DALY, CROWLEY & MOFFORD, LLP SUITE 101 275 TURNPIKE STREET CANTON, MA 02021-2310			KANG, DONGHEE	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/504,660

Applicant(s)

HOKE ET AL.

Examiner

Donghee Kang

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-15 and 18-34 is/are pending in the application.
- 4a) Of the above claim(s) 9-15 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18-30 is/are allowed.
- 6) ☒ Claim(s) 31 and 32 is/are rejected.
- 7) ☒ Claim(s) 33 and 34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Acknowledgment

1. Applicant's Response to Paper No.26 has been entered and made of Record (Paper No.27). Claims 9-15 & 18-34 are pending. However, claims 9-15, non-elected invention, are withdrawn from further consideration.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims **31-32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hur et al (Ultralinear Doubled Pulse doped AlInAs/GaAs/InP HEMTs", Electronic Lett., IEEE Stevenage, GB, Vol.32, No.16, August 1, 1996, pages 1516-1518) in view of Ando (JP08-55979).

Regarding claim **31**, Hur et al. teach a transistor, comprising (Fig.1):

a semi-insulating indium phosphide (InP) substrate; a channel layer of GaInAs disposed over the substrate layer; a Schottky layer of AlInAs disposed over the channel layer; a resistive layer (undoped-GaInAs) disposed over the Schottky layer; a contact layer (doped-GaInAs) disposed over the resistive layer, the contact layer having a first recess, and the resistive layer having a second recess; a source electrode in ohmic contact with the contact layer (doped-GaInAs); a drain electrode in ohmic contact with the contact layer; and a gate electrode in Schottky contact with the Schottky layer.

Hur et al. do not teach the Schottky layer having a recess. However, Ando in Fig.9 teaches the Schottky layer (96) having a recess to obtain a stable device characteristic since an electric field generated by the applied voltage through the gate can be alleviated, which results in the lowered rate of impact ionization of the channel electrons. This also contributes the reduction of the parasitic capacitance between the gate and the cap layer, leading to an increase in the power gain of the device. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to form recess in the Schottky layer as taught by Ando in the Hur's device since it contributes the reduction of the parasitic capacitance between the gate and the cap layer, leading to an increase in the power gain of the device.

Regarding claim **32**, Hur et al. as modified by Ando teach the transistor further comprising a first doped layer and a second doped layer (Si pulse).

Allowable Subject Matter

4. Claims **33-34** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Prior art reference, taken along or in combination, do not teach or render obvious that a ratio of silicon doping concentration approximately 2.5 to 1.5 between the first doped layer and the second doped layer or the resistive layer comprising $\text{Al}_{0.48}\text{In}_{0.52}\text{As}$.

5. Claims **18-30** are allowed.

The following is an examiner's statement of reasons for allowance:

Prior art reference, taken along or in combination, do not teach or render obvious that the lattice constants of the channel layer and lattice constant of the Schottky layer is different from the lattice constant of the substrate and a difference between conduction band levels of the channel and Schottky layers is larger than when the channel and Schottky layers has the same lattice constant as the substrate.

Response to Arguments

6. Applicant's arguments with respect to claims 31-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Donghee Kang

Donghee Kang
Examiner
Art Unit 2811

dhk